decisions. OPACs were universally reported as highly reliable, placing minimal demands on a backup system. Some respondents asserted that backup is unnecessary. Several respondents commented that print formats do not actually provide an alternative to the OPAC; they are merely a limited substitute. The overall expectations for OPAC backup were of an inexpensive, although limited, microform format. A few respondents expressed the hope that a reasonably priced electronic alternative, such as CD-ROM, with more options and potential than present backup formats, would become a feasible format for an OPAC backup in the future.

REFERENCE

1. 1985–1986 Annual statistics of medical school libraries in the United States and Canada. 9th ed. Houston: Association of Academic Health Sciences Library Directors and Houston Academy of Medicine—Texas Medical Center Library, 1986.

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Effects on media materials of storage in proximity to a magnetic resonance imaging scanner

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Loma Linda University Medical Center (LLUMC), originally Loma Linda Sanitarium, has been in existence since 1905. Until 1986 no central internal library existed. A building project begun in 1983 and completed in 1986 added a wing which included a magnetic resonance imaging scanner (MRI) and a medical library. The Medical Center Administration, due to the incorrect perception that the modern library and information center houses only books or journals, felt the library would be the most appropriate department to be situated above the MRI scanner's strong magnet. Offices originally planned to be above the MRI scanner were relocated, partly due to fear of the MRI scanner's effects on those slated to use those offices. Office and work space for the library was located out of the magnet's field. Collection space was limited by zones of magnet strength. Space within spheres of magnetic power was set aside for storage only.

Midway through the building project, a new shielding technique became available and was incorporated in the MRI scanner. The magnet's field strength was reduced, but gauss readings indicated some magnetic influence remained. With this new shielding, the Medical Center Administration authorized an expansion of library space to incorporate the total area originally affected by the magnet. Library conference rooms were placed directly above the MRI itself, and shelving was extended to the original sphere of magnetic influence just outside these conference rooms.

The MRI scanner's manufacturer indicated at the time of construction that LLUMC was the first facility in the United States to locate office areas directly above an MRI scanner. Tests for effect upon personnel were not made available to the Medical Library and Information Center (MLIC) staff. With the advent of new shielding and building techniques, MRI scanners have since been placed in closer proximity to working areas at other sites. The MLIC shelves media materials integrally with its monographs—hence there was additional concern over the effect of long-term storage on those materials. This study was designed and conducted at LLUMC to detect and measure such effects.

THE MRI SCANNER

The MRI scanner, manufactured by Siemens of Germany, is a Siemens Magneton, 2.0 Tesla scanner, running at 1.0 Tesla. (The earth's magnetic field is approximately 0.01 Tesla.) It is a "self-shielded" superconducting magnet, shielded by 176,000 pounds of "transformer iron," and operates at 42 Hz. The room in which it is housed is shielded only for "RF" interference from outside sources.

TEST EQUIPMENT

Videocassettes.
A Sony VO-5850 videotape player was used to record color bars from a Panasonic WJ-4600 switcher onto two Fuji H521 (¾") videocassette tapes. The two videocassette tapes also received an audio tone of 1,000 Hz at 0 db gain on channel #2.

Video equipment.
The videocassette tapes were tested on a Videotek TSM-5A Waveform for black and white resolution and on a Videotek VSM-5A Vectorscope for color and audio integrity.

Audiocassettes.
A Tascam 133B audiocassette recorder was used to record a 1,000 Hz signal at 0 db gain on channel #2

with no audio recorded on channel #1 onto two Sony UCX-S60 audiocassettes.

Audio equipment.
The audiocassettes were tested on a Tascam 133B audiocassette recorder.

TEST PROCEDURE

Two cassette tapes (one audio, one video) were stored in the library office approximately eighty feet from the MRI and approximately eight feet above the floor. The two were clearly marked "control tape," and were never taken closer than eighty feet from the MRI. The other two cassette tapes were marked "test tape," and stored on a cart approximately fourteen inches above the library floor. The cart was placed as close to a point directly above the MRI as possible.

Approximately every other week, personnel from the Audio Visual Services department would pick up the test and control cassette tapes and transport them to the AV building for testing. This procedure began on September 25, 1986, and continued through February 3, 1988, when the Audio Visual Services department was restructured, and the major test equipment was no longer available.

At each test reading, the control cassette tape was read by the waveform monitor and Vectorscope first, then the test cassette tape was read. The control audiocassette was used to set the meter of the Tascam 133B audiocassette recorder to 0 db, after which the level of the test cassette tape was read. During the test period, no appreciable change or difference between the test and control were observed. Changes on the videocassette were looked for in the audio tone, video level (white level), the pedestal (black level), the hue, and the saturation of each color in the color bars. In addition, channels with no recorded signal were tested for signals which might have "bled" over. Changes tested for on the audiocassette were in consistency of tone on channel #2 and lack of signal on channel #1.

A computer diskette (5¼" IBM DS/DD 360K) was stored with the vidiocassettes and audiocassettes for the first two months of the test period. During that time, the test disk (no control disk tested) was evaluated daily, using NORTON UTILITIES, for sector loss or data corruption. During this short period of testing, no data problems were discovered. The Disk Test (DT) did not turn up any sector or file contamination.

DISCUSSION/CONCLUSION

Magnetic fields pose potential danger to magnetic media. Studies of possible effects on human exposure have been conducted since 1978 [1]. Effects of long-term exposure to a magnetic resonance imager upon magnetic media has yet to be documented, and longer-term studies are needed. In the case of Loma Linda University Medical Center's Medical Library and Information Center, the close proximity to equipment and magnetically coded media is a major concern. A second MRI twice as powerful as the existing scanner is currently being installed beneath the MLIC. It is being placed below the office and work areas of the MLIC staff. The effects upon the computerized MLIC, its media collection, and its staff are still uncertain, and the controversy continues [2-18]. At this time, it would appear that the media collection has been unaffected by its proximity to the magnet for the short-term period of seventeen months.

REFERENCES

1. PASTAKIA B. Biologic effects of electromagnetic fields [letter]. N Engl J Med 1978 Jun 15;298(24):1366.

2. ENGLER MB, ENGLER MM. Magnetic resonance imaging: an overview and safety considerations. *JEN* 1986 Nov/Dec;12(6):360-4.

3. SCHROEDER PM, et al. Magnetic resonance tomography in patients with nerve pacemakers. *ROFO* 1987 Aug;147(2):198-9.

4. MESSMER JM, et al. Exposure to magnetic resonance imaging does not produce taste aversion in rats. Physiol Behav 1987;40(2):259-61.

5. TESKEY GC, et al. Survivability and long-term stress reactivity levels following repeated exposure to nuclear magnetic resonance imaging procedures in rats. Physiol Chem Phys Med NMR 1987;19(1):43-9.

6. DE CRESCENZO S, et al. Risks from magnetic fields and radiowaves in equipment for magnetic resonance tomography. Radiol Med (Torino) 1987 Jun;73(6): 551-6.

7. SHIVERS RR, et al. Magnetic resonance imaging temporarily alters blood-brain barrier permeability in the rat. Neurosci Lett 1987 Apr 23;76(1):25-31.

8. SWEETLAND J, et al. The effect of magnetic resonance imaging on human cognition. Magn Reson Imaging 1987;5(2):129-35.

9. VON KLITZING L, et al. Static NMR magnetic fields change somatosensory evoked potentials in the human. EEG EMG 1987 Mar;18(1):43-6.

10. GONET B. Constant magnetic field as a pathogenetic factor in NMR tomography. Pol Przegl Radiol (Warszawa) 1986 Mar/Apr;50(2):121-3.

11. PRATO FS. Hazards and associated recommendations for Canadian MR imaging sites. J Can Assoc Radiol 1986 Dec;37(4):233-7.

12. GRAUL EH. How dangerous is NMR tomography? Wien Med Wochenschr 1986 Aug 31;136(15-16):411-2.

13. BARTELS M. Magnetic resonance tomography and safety. Electroencephalographic and neuropsychologic findings before and after MR studies of the brain. *ROFO* 1986 Oct;145(4):383-5.

14. LERNER MA. Evaluation of new diagnostic imaging technologies. Isr J Med Sci 1986 Mar/Apr;22(3-4): 203-6.

15. SACKS E. The effects of nuclear magnetic resonance imaging on ocular tissues. Arch Ophthalmol 1986 Jun; 104(6):890-3.

16. ERLEBACHER JA. Effect of magnetic resonance imaging on DDD pacemakers. Am J Cardiol 1986 Feb 15;57(6):437-40.

17. OSSENKOPP KP, et al. Exposure to nuclear magnetic resonance imaging procedure attenuates morphine-induced analgesia in mice. Life Sci 1985 Oct 21;37(16): 1507-14.

18. RINCK PA. Risk and dangers in nuclear magnetic resonance tomography. Suggestions for protection and surveillance. Dtsch Med Wochenschr 1983 Jun 24; 108(25):992-4.

All references were recovered using: Nuclear Magnetic:/AE on the MEDLINE Files back through 1977.

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A lending library for medical students in the eighteenth century

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Some of the problems of medical school libraries have a long history, as can be found in the eminent German physician and educator Ernst G. Baldinger's proposal in 1791 to establish a lending library for medical students in Marburg, where he had joined the medical faculty [1]. Lending libraries were no novelty at this time and were related to the widespread growth of reading societies in Germany [2]. In fact Baldinger had already established a lending library for medical students at Göttingen in 1782, where he had previously been on the medical faculty.

Ernst G. Baldinger (1738-1804) was a great grandson of Martin Luther and has been described by one of his biographers as one who thirsted for much knowledge, as well as much wine [3]. However, there is general agreement that he was an able physician and a noted medical educator as well as a great bibliophile. At his death he left a library of 10,504 medical works as well as 5,055 works in natural history and 13,000 dissertations [4]. He was also a dedicated and prolific medical editor and was responsible for no less than seven medical journals during his lifetime.

I have translated a part of his 1791 proposal to indicate that perhaps some of our contemporary problems in medical librarianship have a long ancestry and that despite our great advances in technology some of them may not yet have been entirely solved. He begins:

Even in Göttingen, where the university library is so rich in books, I found it necessary to establish a medical library for those studying medicine there—then 101 in number. I published my reasons and the plan for the library for the first time in the [his own] *Neues Magazin für Aerzte* and in a small publication with the title "Nachricht vom medicinischen Lese-Institut, nebst einem Vorbericht vom Studiren" (Göttingen, 1782). The reasons I gave were as follows:

1. The public library [i.e., university library] was not able with the single copies they possessed to serve all the learned patrons and still less all of them at the same time. The university library would have had to have at least ten copies of Haller's *Physiology* in order to satisfy the complaints and grievances of all those who asked for a volume of this work.

Frequently I myself was not able to obtain a single one of thirty books which I asked for. That is to say:

a. The book was on loan.
b. They couldn't find the slip.
c. [They said] it didn't exist.
d. It had been ordered but not yet received.
e. It was still at the bookbinder's.
f. The bookbinder, because of the large number of others that he had to bind, had still not delivered it.
g. The bookbinder had indeed delivered it, but it had not yet been entered in the alphabetic and in the subject catalog and thus could not be issued.
h. It had been misplaced on the book shelves and could not be found. Thus Baumé's pharmaceutical book *Transactions sur l'Aether* was put with those on the physics of ether, and I found it by happy accident myself, by speculating that the book might have happened to stray there.
i. Many professors have the habit of requiring two, three, or four hundred books at the same time; return them, it is true, at Christmas and Easter; but take them back immediately and consider them their personal property for their entire lives. *Exempla sunt odiosa.*
j. One professor was so begrudging that, although he owned a copy of the book, he would still borrow the library copy and another from Professor Büttner and still another from Dr. W., who was still living there, so that no one could see it. Unfortunately [sic] I was able to obtain the book and let all my friends use it and thus fulfilled the need.